

1. A sound recording arrangement comprising:
a plurality of at least three microphones, with at least one pair of said microphones
providing a sound time-of-arrival difference of approximately 0.9msec; and
means for communicating signals of said microphones to other equipment.

2. The arrangement of claim 1 where said means is output ports, recording
apparatus, or a signal transmission apparatus.

3. The arrangement of claim 1 where said microphones are directional.

4. The arrangement of claim 5 where said plurality of directional microphones, as a
group, are more sensitive to sound arriving from a front direction of said arrangement than
from any other direction.

5. The arrangement of claim 3 where a majority of said microphones point to
directions lying substantially on a horizontal plane.

6. The arrangement of claim 5 having at least one microphone additional
microphone that is aimed at other than on said horizontal plane.

7. The arrangement of claim 5 where one of said microphones that point to
directions lying on a horizontal plane points to a front direction.

8. The arrangement of claim 7 where others of said microphones that point to
directions lying on a horizontal plane are paired up, and each pair j is pointed to directions
 $\pm\alpha_j$, where $\alpha_i \neq \alpha_j$ when $i \neq j$.

9. The arrangement of claim 8 where sensitivity of a microphone that points at
direction α_j has a sensitivity at direction $\alpha_{j\pm1}$ that is down 3 db from said sensitivity at
direction α_j , and said sensitivity of a microphone that points at direction α_j has a sensitivity
at direction $\alpha_{j\pm2}$ that is more than 40db down from said sensitivity at direction α_j .

10. The arrangement of claim 1 where said microphones are situated at effective positions in space that lie on a surface that approximates a sphere.

5 11. The arrangement of claim 10 where said sphere has a diameter that corresponds to a time of sound travel of approximately 0.9msec.

12. The arrangement of claim 1 where said a plurality of at least three microphones comprises a plurality of at least three microphones that point to directions on a horizontal plane, and an additional microphone that points at a direction that is substantially
10 perpendicular to said horizontal plane.

13. The arrangement of claim 12 where said additional microphone points downward from said horizontal plane, or upward from said horizontal plane.

14. The arrangement of claim 1 where said a plurality of at least three microphones comprises a plurality of at least three microphones that point at directions substantially on a horizontal plane, one additional microphone that points at a direction that is substantially perpendicular and upward from said horizontal plane, and another additional microphone
20 that points at a direction that is substantially perpendicular and downward from said horizontal plane.

15. The arrangement of claim 14 further comprising a storage medium coupled to said means for communicating signals of said microphones to other equipment, for storing
25 in a separate area the signals of each of said plurality of microphones.

16. The arrangement of claim 14 further comprising a processor for combining selected ones of said signals of said plurality of at least three microphones.

30 17. The arrangement of claim 16 where said processor develops a modified signal

$s'_h = s_h + \frac{1}{\sqrt{N}}(s_u + s_d)$, for each signal s_h of a microphone from said plurality of at least three microphones that points at a direction that lies substantially on said horizontal plane, where s_u is the signal of said microphone that points substantially upward relative to said horizontal plane, and said s_d is the signal of said microphone that points substantially downward relative to said horizontal plane.

18. The arrangement of claim 1 where said plurality of at least three microphones comprises an odd number of microphones that point to directions that lie substantially on a horizontal plane.

19. The arrangement of claim 18 where said plurality of at least three microphones comprises five microphones that point to directions 0° , $\pm 72^\circ$, and $\pm 144^\circ$.

20. The arrangement of claim 18 where said plurality of at least three microphones comprises seven microphones that nominally point to directions 0° , $\pm 45^\circ$, $\pm 90^\circ$, and $\pm 150^\circ$.

21. An arrangement to reproduce sound from a plurality of channels, comprising:
 an N plurality of input ports for receiving signals picked up by an N plurality of microphones, where one of said microphones points at a direction that is substantially perpendicular to and upward from a horizontal plane and picks up signal s_u , another of said microphones points at a direction that is substantially perpendicular to and downward from said horizontal plane and picks up signal s_d , and remaining N-2 of said microphones point at directions that substantially lie in said horizontal plane and pick up signals s_h^i ; and
 a processor for developing signals s_h^i , $i=1, 2, \dots, N-2$, such that

$$s_h^i = s_h^i + \frac{1}{\sqrt{N}}(s_u + s_d).$$